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MULTIPLE ALLOYS

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5 Claims. (Cl. 75—168)

This application is a continuation in part of my prior application Serial No. 643,297, filed November 18, 1932.

The present improved alloy is one in which magnesium is the predominant element, the primary object being to develop an alloy that will possess the characteristic low specific gravity which is obtained by the use of magnesium in excess of 80 per cent. while such alloy will be characterized by higher resistance to corrosion and at the same time will have a higher strength than the known alloys of this kind.

The known alloys in use containing generally more than 85% magnesium and as principal additional ingredient aluminum or zinc or both of these ingredients, other constituents such as manganese being present in relatively small amounts, do not exhibit a sufficient resistance to corrosion by water or even by damp air, and cannot be used at all when in continuous contact with sea-water. Various attempts have been made to render the surfaces of these metals more resistant by applying coatings, but such attempts failed since corrosion often takes place to an increased extent when the superficial protective layer is damaged.

The object of the invention is attained by the addition of further additional metals to the alloys, namely antimony or bismuth or both of these metals amounting in general to not less than 0.05% and not more than 2% of the total.

The most diverse alloys of the kind referred to containing antimony or bismuth have proved distinctly superior, when exposed to the action of a 3% solution of common salt, to alloys of the same kind which do not contain antimony or bismuth; whilst the alloys containing antimony or bismuth shown an almost unaltered surface, the samples devoid of antimony or bismuth were strongly corroded on carrying out the comparative tests.

In general the lower limit of efficiency is given by additions of 0.05%, and it is preferable not to exceed the upper limit of 2%.

From their position in the electrochemical series antimony and bismuth are more valuable than magnesium, and moreover do not form a solid solution with the latter; the assumption therefore would rather have been that the addition of these metals to the known alloys of magnesium would involve decreasing their resistance to corrosion.

The magnesium-base alloys developed by the present invention show also a considerable increase in strength, without the elongation decreasing. As the magnesium alloys of the kind hitherto in use (electron, Dow metal) have a comparatively small strength, this constitutes a further advance of considerable importance, the more so as the specific gravity of the alloys is scarcely increased to any perceptible extent by the small amount of the added metals.

Furthermore, the alloys according to the invention show in comparison with similarly composed known electron alloys an increase of the permanent impact strength by 50%.

The alloys may be used as cast alloys or mechanically worked alloys and may be improved by thermal treatments.

A satisfactory formula for an alloy according to my invention, in which aluminium is the principal additional ingredient is as follows, viz:—magnesium 91,3%, aluminum 8%, manganese 0,2%, antimony 0,5%; for such an alloy in which zinc is the principal additional ingredient satisfactory formulæ are as follows, viz:—magnesium 94,7%, zinc 4%, manganese 0,3%, antimony 1%; magnesium 96,2%, zinc 3%, manganese 0,5%, bismuth 0,3%. For an alloy including both aluminum and zinc the following compositions may be given by way of example, viz:—magnesium 93,5%, aluminum 4%, zinc 1%, manganese 1%, antimony 0,5%; magnesium 90,3%, aluminum 5%, zinc 3%, manganese 1,2%, bismuth 0,5%; magnesium 94,2%, aluminum 4%, zinc 1%, manganese 0,3%, antimony 0,3%, bismuth 0,2%.

What I claim is:—

1. A low specific gravity magnesium base alloy containing from 80 to 98.8 per cent of magnesium, aluminum in an amount from 1 to 16 per cent, manganese in an amount between 0.12 to 2 per cent, and a metal selected from the group consisting of antimony and bismuth in an amount from 0.05 to 2 per cent, the alloy being more resistant to corrosion than an alloy of the same composition but not containing a metal selected from the said group.

2. A low specific gravity magnesium base alloy, consisting of from 80 to 98.8 per cent of magnesium, from 1 to 16 per cent of aluminum, from 0.15 to 2 per cent of manganese, and from 0.05 to 2 per cent of antimony.

3. A low specific gravity magnesium base alloy, consisting of from 80 to 98.8 per cent of magnesium, from 1 to 16 per cent of aluminum, from 0.15 to 2 per cent of manganese, and from 0.05 to 2 per cent of bismuth.

4. A low specific gravity magnesium base alloy, consisting of from 80 to 98.8 per cent of magnesium, from 1 to 16 per cent of aluminum, from

0.15 to 2 per cent of manganese, and a metal selected from the group consisting of antimony and bismuth in an amount from 0.05 to 2 per cent.

5. As a new article of manufacture, an article resistant to corrosion and formed from an alloy containing magnesium, aluminum and manganese, the magnesium being present in an amount from 80 to 98.8 per cent, the aluminum being present in an amount from 1 to 16 per cent, the amount of manganese being from 0.15 to 2 per cent, and the alloy containing from 0.05 to 2 per cent of a metal selected from the group consisting of antimony and bismuth, the alloy being more resistant to corrosion than an alloy of the same composition but not containing a metal selected from said group.

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